

### **What is claimed is:**

**[Claim 1]** 1. A method of automatic light emitting device calibration for an optical device having a light emitting device and a photo monitor, comprising the following steps:

controlling power of the light emitting device by changing values of a drive signal to the light emitting device;

detecting light emitted by the light emitting device and generating a monitor signal having a value corresponding to the light emitted by the light emitting device utilizing the photo monitor; and

determining a preliminary power relationship relating values of the drive signal to powers of the light emitting device according to received monitor signal values for a plurality of drive signal values and a predetermined conversion rule for converting the received monitor signal values to corresponding powers of the light emitting device.

**[Claim 2]** 2. The method of claim 1, wherein determining the preliminary power relationship relating the values of the drive signal to the powers of the light emitting device comprises the following steps:

determining an offset value being a maximum value of the drive signal where the light emitting device does not emit light according to the received monitor signal values; and

converting the received monitor signal values corresponding to drive signal values being higher than the offset value to power values according to the predetermined conversion rule to thereby generate the preliminary power relationship.

**[Claim 3]** 3. The method of claim 2, wherein determining the preliminary power relationship relating the values of the drive signal to the powers of the light emitting device further comprises the following steps:

controlling the power of the light emitting device by utilizing a first drive signal value and a second drive signal value;

extrapolating monitor signal values of a line formed between a first received value of the monitor signal corresponding to the first drive signal value, and a second received value of the monitor signal corresponding to the second drive signal value;

determining the offset value of the drive signal to be a crossing value of the drive signal corresponding to where the extrapolated monitor signal values of the line cross a predetermined value of the monitor signal when the light emitting device is not emitting any light; and

converting the extrapolated monitor signal values of the line corresponding to drive signal values being higher than the offset value to power values according to the predetermined conversion rule to thereby generate the preliminary power relationship.

**[Claim 4]** 4. The method of claim 1, further comprising generating a final power relationship by performing a power relationship correction operation on an optical medium of the optical device; the power relationship correction operation comprising the following steps:

writing test data to the optical medium of the optical device using a particular drive signal value for a predetermined power value according to the preliminary power relationship;

reading a read signal corresponding to the test data from the optical medium;  
and

analyzing the read signal to determine if the test data was written to the optical medium at the particular power and correspondingly adjusting the preliminary power relationship such that the test data is written to the optical medium at the predetermined power to thereby generate the final power relationship.

[Claim 5] 5. The method of claim 4, wherein the power relationship correction operation involves performing an optimum power control (OPC) on the optical medium of the optical device.

[Claim 6] 6. The method of claim 5, further comprising performing the OPC using a non-OPC area of the optical medium.

[Claim 7] 7. The method of claim 4, further comprising storing the final power relationship in a non-volatile memory of the optical device; and during normal operations, controlling values of the drive signal to control the power of the light emitting device according to the final power relationship stored in the non-volatile memory.

[Claim 8] 8. The method of claim 1, wherein the optical device is an optical disc drive or an optical disc recorder, the photo monitor is a front monitor diode (FMD), and the light emitting device is a laser diode.

[Claim 9] 9. The method of claim 8 being used to configure the write power or the read power of the laser diode.

[Claim 10] 10. An auto-calibrating optical device comprising:

a light emitting device to be calibrated;

a photo monitor for detecting light emitted by the light emitting device and generating a monitor signal having a value corresponding to the light emitted by the light emitting device; and

a microprocessor coupled to the light emitting device and the photo monitor for controlling power of the light emitting device by changing values of a drive signal to the light emitting device; and for during a calibration mode, determining a preliminary power relationship relating values of the drive signal to powers of the light emitting device according to received monitor signal values for a plurality of drive signal values and a predetermined conversion rule for converting the received monitor signal values to corresponding powers of the light emitting device.

[Claim 11] 11. The auto-calibrating optical device of claim 10, wherein to determine the preliminary power relationship relating the values of the drive signal to the powers of the light emitting device, the microprocessor determines an offset value being a maximum value of the drive signal where the light emitting device does not emit light according to the received monitor signal values; and converts the received monitor signal values corresponding to drive signal values being higher than the offset value to power values according to the predetermined conversion rule to thereby generate the preliminary power relationship.

[Claim 12] 12. The auto-calibrating optical device of claim 11, wherein to determine the preliminary power relationship relating the values of the drive signal to the powers of the light emitting device, the microprocessor further controls the power of the light emitting device by utilizing a first drive signal value and a second drive signal value; extrapolates monitor signal values of a line formed between a first received value of the monitor signal corresponding

to the first point, and a second received value of the monitor signal corresponding to the second drive signal value; determines the offset value of the drive signal to be a crossing value of the drive signal corresponding to where the extrapolated monitor signal values of the line cross a predetermined value of the monitor signal when the light emitting device is not emitting any light; and converts the extrapolated monitor signal values of the line corresponding to drive signal values being higher than the offset value to power values according to the predetermined conversion rule to thereby generate the preliminary power relationship.

[Claim 13] 13. The auto-calibrating optical device of claim 10, wherein the microprocessor is for further generating a final power relationship by performing a power relationship correction operation on an optical medium of the optical device; the power relationship correction operation comprising the microprocessor writing test data to the optical medium of the optical device using a particular drive signal value for a predetermined power value according to the preliminary power relationship; reading a read signal corresponding to the test data from the optical medium; and analyzing the read signal to determine if the test data was written to the optical medium at the particular power and correspondingly adjusting the preliminary power relationship such that the test data is written to the optical medium at the predetermined power to thereby generate the final power relationship.

[Claim 14] 14. The auto-calibrating optical device of claim 11, wherein the power relationship correction operation involves the microprocessor performing an optimum power control (OPC) on the optical medium of the optical device.

[Claim 15] 15. The auto-calibrating optical device of claim 12, wherein the microprocessor performs the OPC using a non-OPC area of the optical medium.

**[Claim 16]** 16. The auto-calibrating optical device of claim 11, further comprising a non-volatile memory for storing the final power relationship determined by the microprocessor during the calibration mode, the final power relationship being used by the microprocessor during normal operations for controlling values of the drive signal according to desired powers of the light emitting device.

**[Claim 17]** 17. The auto-calibrating optical device of claim 10, wherein the optical device is an optical disc drive or a optical disc recorder, the photo monitor is a front monitor diode (FMD), and the light emitting device is a laser diode.

**[Claim 18]** 18. The auto-calibrating optical device of claim 17 being capable of calibrating the write power or the read power of the laser diode.